IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Keeth, et al.	**Examiner:**	Not yet assigned
Serial No.:	09/885,217	**Art Unit:**	
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Entitled: 256 MEG DYNAMIC RANDOM ACCESS MEMORY

Claims 223-237, 247-250 are OK for 327/538 T.Lam 5/4/02

Complete set of Pending Claims

223. A voltage reference circuit responsive to an external voltage for supplying a reference voltage, comprising:

an active reference circuit for receiving the external voltage and for producing a reference signal having a desired relationship with the external voltage; and

a unity gain amplifier responsive to said reference signal for producing the reference voltage.

224. The voltage reference circuit of claim 223 wherein said active reference circuit comprises a current source providing current to a diode stack having an adjustable impedance for producing said reference signal.

225. The voltage reference circuit of claim 224 wherein said diode stack includes a plurality of transistors connected in series, with each transistor's gate connected to a common potential, and a plurality of switches each for selectively shunting one of said transistors.

226. The voltage reference circuit of claim 225 wherein said switches are controlled by fuses, and wherein opening certain of said fuses turns its associated switch on, and wherein opening certain other of said fuses turns its associated switch off.

227. The voltage reference circuit of claim 226 wherein said plurality of transistors includes a first plurality of field effect transistors and wherein said plurality of switches includes a second plurality of field effect transistors.

228. The voltage reference circuit of claim 223 additionally comprising a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a predetermined value.

229. The voltage reference circuit of claim 228 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

230. The voltage reference circuit of claim 229 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

231. A voltage reference circuit in combination with a power amplifier, said combination comprising:

an active reference circuit for receiving the external voltage and for producing a reference signal having a desired relationship to the external voltage;

a unity gain amplifier responsive to said reference signal for producing a reference voltage; and

a power amplifier stage for amplifying the reference voltage by a factor greater than unity to provide an output voltage.

232. The combination of claim 231 additionally comprising a circuit for supplying the external voltage as the output voltage when the external voltage is below a first predetermined value.

233. The combination of claim 232 wherein said circuit for supplying includes a switch for shorting a bus carrying the external voltage with a bus carrying the output voltage.

234. The combination of claim 232 additionally comprising a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a second predetermined value.

235. The combination of claim 234 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

236. The combination of claim 235 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

237. The combination of claim 234 wherein said combination supplies an output voltage which increases at a first slope substantially the same as a slope of the external voltage during a powerup range, increases at a second slope substantially less than a slope of the external voltage during an operating range, and increases at a third slope greater than a slope of the external voltage during a burn-in range of the external voltage.

247. A method of supplying an output voltage in response to an external voltage, and wherein the output voltage has a first characteristic when the external voltage is in a powerup range, has a second characteristic when the external voltage is in an operating range, and has a third characteristic when the external voltage is in a burn-in range, said method comprising the steps of:

supplying the external voltage as the output voltage when the external voltage is below a first predetermined value defining the powerup range;

producing a reference signal having a desired relationship with the external voltage;

amplifying the reference signal with a unity gain amplifier for producing a reference voltage when the external voltage is above said first predetermined value;

amplifying the reference voltage by a factor greater than unity to provide the output voltage when the external voltage is not being supplied as the output voltage; and

pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds said second predetermined value defining the burn-in range.

248. The method of claim 247 wherein said step of producing a reference signal includes the steps of generating a current related to the external voltage, applying the current to a circuit node, and draining the current from the circuit node through an adjustable impedance.

249. The method of claim 248 additionally comprising the step of adjusting the impedance to modify the reference signal.

250. The method of claim 249 wherein said step of adjusting the impedance includes the step of opening a fuse.

466. A memory device, comprising:

an array of memory cells;

a plurality of peripheral devices for moving information into and out of said array of memory cells;

a plurality of voltage supplies for generating a plurality of supply voltages; and

a power distribution bus for delivering said plurality of supply voltages to said array and said plurality of peripheral devices, and wherein at least one of said voltage supplies comprises:

an active reference circuit for receiving an external voltage and for producing a reference signal having a desired relationship to the external voltage; and

an amplifier having a gain of substantially unity for producing a reference voltage.

467. The memory device of claim 466 wherein said active reference circuit comprises a current source for providing current to a diode stack having an adjustable impedance for producing said reference signal.

468. The memory device of claim 467 wherein said diode stack includes a plurality of transistors connected in series, with each transistor's gate connected to a common potential, and a plurality of switches each for selectively shunting one of said transistors.

469. The memory device of claim 468 wherein said switches are controlled by fuses, and wherein opening certain of said fuses turns its associated switch on, and wherein opening certain other of said fuses turns its associated switch off.

470. The memory device of claim 469 wherein said plurality of transistors includes a first plurality of field effect transistors and wherein said plurality of switches includes a second plurality of field effect transistors.

471. The memory device of claim 466 wherein said one of said voltage supplies additionally comprises a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a predetermined value.

472. The memory device of claim 471 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

473. The memory device of claim 472 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

474. A memory device, comprising:

an array of memory cells;

a plurality of peripheral devices for moving information into and out of said array of memory cells;

a plurality of voltage supplies for generating a plurality of supply voltages; and

a power distribution bus for delivering said plurality of supply voltages to said array and said plurality of peripheral devices, and wherein at least one of said voltage supplies includes a voltage reference circuit in combination with a power amplifier, said combination comprising:

an active reference circuit for receiving the external voltage and for producing a reference signal having a desired relationship to the external voltage;

a unity gain amplifier responsive to said reference signal for producing a reference voltage; and

a power amplifier stage for amplifying the reference voltage by a factor greater than unity to provide an output voltage.

475. The memory device of claim 474 wherein said combination additionally comprises a circuit for supplying the external voltage as the output voltage when the external voltage is below a first predetermined value.

476. The memory device of claim 475 wherein said circuit for supplying includes a switch for shorting a bus carrying the external voltage with a bus carrying the output voltage.

477. The memory device of claim 475 wherein said combination additionally comprises a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a second predetermined value.

478. The memory device of claim 477 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

479. The memory device of claim 478 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

480. The memory device of claim 477 wherein said combination supplies an output voltage which increases at a first slope substantially the same as a slope of the external voltage during a powerup range, increases at a second slope substantially less than a slope of the external voltage during an operating range, and increases at a third slope greater than a slope of the external voltage during a burn-in range of the external voltage.

481. A system, comprising:

a control unit for performing a series of instructions; and

a dynamic random access memory responsive to said control unit, said memory comprising:

an array of memory cells;

a plurality of peripheral devices for moving information into and out of said array of memory cells;

a plurality of voltage supplies for generating a plurality of supply voltages; and

a power distribution bus for delivering said plurality of supply voltages to said array and said plurality of peripheral devices, and wherein at least one of said voltage supplies comprises:

an active reference circuit for receiving an external voltage and for producing a reference signal having a desired relationship to the external voltage; and

an amplifier having a gain of substantially unity for producing a reference voltage.

482. The system of claim 481 wherein said active reference circuit comprises a current source for providing current to a diode stack having an adjustable impedance for producing said reference signal.

483. The system of claim 482 wherein said diode stack includes a plurality of transistors connected in series, with each transistor's gate connected to a common potential, and a plurality of switches each for selectively shunting one of said transistors.

484. The system of claim 483 wherein said switches are controlled by fuses, and wherein opening certain of said fuses turns its associated switch on, and wherein opening certain other of said fuses turns its associated switch off.

485. The system of claim 484 wherein said plurality of transistors includes a first plurality of field effect transistors and wherein said plurality of switches includes a second plurality of field effect transistors.

486. The system of claim 481 wherein said one of said voltage reference supplies additionally comprises a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a predetermined value.

487. The system of claim 486 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

488. The system of claim 487 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

489. A system, comprising:

a control unit for performing a series of instructions; and

a dynamic random access memory responsive to said control unit, said memory comprising:

an array of memory cells;

a plurality of peripheral devices for moving information into and out of said array of memory cells;

a plurality of voltage supplies for generating a plurality of supply voltages; and

a power distribution bus for delivering said plurality of supply voltages to said array and said plurality of peripheral devices, and wherein at least one of said voltage supplies includes a voltage reference circuit in combination with a power amplifier, said combination comprising:

an active reference circuit for receiving the external voltage and for producing a reference signal having a desired relationship to the external voltage;

a unity gain amplifier responsive to said reference signal for producing a reference voltage; and

a power amplifier stage for amplifying the reference voltage by a factor greater than unity to provide an output voltage.

490. The system of claim 489 wherein said combination additionally comprises a circuit for supplying the external voltage as the output voltage when the external voltage is below a first predetermined value.

491. The system of claim 490 wherein said circuit for supplying includes a switch for shorting a bus carrying the external voltage with a bus carrying the output voltage.

492. The system of claim 490 wherein said combination additionally comprises a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a second predetermined value.

493. The system of claim 492 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

494. The system of claim 493 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

495. The system of claim 492 wherein said combination supplies an output voltage which increases at a first slope substantially the same as a slope of the external voltage during a powerup range, increases at a second slope substantially less than a slope of the external voltage during an operating range, and increases at a third slope greater than a slope of the external voltage during a burn-in range of the external voltage.

496. A voltage reference circuit responsive to an external voltage for supplying a reference voltage, comprising:

a constant current source for supplying a current to a node in response to the external voltage;

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a circuit having an adjustable impedance for draining current from the node; and

a unity gain amplifier responsive to a signal available at the node for producing the reference voltage.

497. The voltage reference circuit of claim 496 wherein said circuit having an adjustable impedance includes a diode stack.

498. The voltage reference circuit of claim 497 wherein said diode stack includes a plurality of transistors connected in series, with each transistor's gate connected to a common potential, and a plurality of switches each for selectively shunting one of said transistors.

499. The voltage reference circuit of claim 498 wherein said switches are controlled by fuses, and wherein opening certain of said fuses turns its associated switch on, and wherein opening certain other of said fuses turns its associated switch off.

500. The voltage reference circuit of claim 499 wherein said plurality of transistors includes a first plurality of field effect transistors and wherein said plurality of switches includes a second plurality of field effect transistors.

501. The voltage reference circuit of claim 496 additionally comprising a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a predetermined value.

502. The voltage reference circuit of claim 501 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

503. The voltage reference circuit of claim 502 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

504. A voltage reference circuit in combination with a power amplifier, said combination comprising:

a constant current source for supplying a current to a node in response to an external voltage;

a circuit having an adjustable impedance for draining current from the node;

a unity gain amplifier responsive to a signal available at the node for producing a reference voltage; and

a power amplifier stage for amplifying the reference voltage by a factor greater than unity to provide an output voltage.

505. The combination of claim 504 additionally comprising a circuit for supplying the external voltage as the output voltage when the external voltage is below a first predetermined value.

506. The combination of claim 505 wherein said circuit for supplying includes a switch for shorting a bus carrying the external voltage with a bus carrying the output voltage.

507. The combination of claim 505 additionally comprising a pullup stage for pulling up the reference voltage so as to substantially track the external voltage when the external voltage exceeds a second predetermined value.

508. The combination of claim 507 wherein said pullup stage includes a plurality of diodes connected between the external voltage and the reference voltage.

509. The combination of claim 508 wherein the reference voltage is the external voltage less a voltage drop across said plurality of diodes.

510. The combination of claim 507 wherein said combination supplies an output voltage which increases at a first slope substantially the same as a slope of the external voltage during a powerup range, increases at a second slope substantially less than a slope of the external voltage during an operating range, and increases at a third slope greater than a slope of the external voltage during a burn-in range of the external voltage.